CARSWELL AFB
TEXAS

ADMINISTRATIVE RECORD
COVER SHEET

AR File Number 761

CARSWELL / PLANT 4
RESTORATION ADVISORY BOARD MEETING

DRAFT-FINAL
SUMMARY MINUTES OF MAY 9, 2002
REGULAR QUARTERLY MEETING

A regular meeting of the Carswell / Plant 4 Restoration Advisory Board (RAB) was held May 9, 2002 at the Lockheed Martin Recreation Association Ranch House, 3400 Bryant Irvin Road, Fort Worth, Texas. The RAB meeting began at 6:00 pm.

Agenda

Welcome / Introductions
- Approval of Minutes

Air Force Plant 4
- Electrical Resistance Heating
- FY2003 Budget
- Radioisotope Sampling

Carswell Off-base
- Golf Course
- Weapons Storage Area

Carswell On-base
- Permeable Reactive Wall
- Base Service Station
- SWMUs 40, 54, and 55

Community Affairs
- School Outreach

Next Meeting

Open Discussion

Welcome and Introduction

Ms. Pate made introductions and stressed the importance of speakers identifying themselves for inclusion in the meeting minutes. The minutes of the February meeting were approved without comment. Ms. Pate stated that Leland Clemons from the Westworth Redevelopment Authority would not be in attendance.

Air Force Plant 4

Ms. Pate introduced George Walters from Wright-Patterson AFB in Dayton, OH to speak about Air Force Plant 4. Mr. Walters stated that he would give an update on three projects, electrical resistance heating, the FY2003 budget, and Radioisotope sampling.

Electrical Resistance Heating

Mr. Walters explained that historical TCE contamination occurred at Building 181 prior to 1990, and in 1991 there was a large release from a leaking tank. Interim actions using soil vapor extraction have been in place for the last ten years. About a year and a half ago, an electrical resistance heating pilot study was conducted. The pilot study was successful and the decision was made to expand it. Prior to expanding the electrical resistance heating, test holes were drilled into the bedrock to make sure that it's not fractured because fractures would retain TCE and continue to release it into the groundwater. The test holes determined that the bedrock is not fractured. Inside the building, extraction wells are already going to a catalytic oxidation system that breaks down the TCE, so the electrical resistance heating will enhance existing efforts.

TCE boils at 72 degrees C, and water boils at 100 degrees C. The subsurface down to bedrock (approximately 35 feet deep) under Building 181 (approximately half an acre in area) will be heated up to 100 degrees to boil off the TCE. There are 59 electrodes in the ground along with 88 extraction wells. To keep from disturbing aircraft production, the wells were drilled at night. Electrodes were placed in the wells and the current passing through the electrodes will generate the heat. The power units and electrical lines have been installed. The 4,160 volts of electricity from the substation goes through a row of transformers to break the electricity down into three phases. The system has been turned on and the subsurface should reach 100 degrees C in 30 to 50 days.

FY2003 Budget

Before beginning his budget overview, Mr. Walters stated that obtaining funding would be more difficult because of money being diverted to the war effort. As always, one of next year's projects will be groundwater monitoring. This will continue for the next 20 to 25 years. Another project will be to use Forward Looking Infrared Radar (FLIR) to look for seeps along the creek because contamination could be flowing out of the seeps. Because seeps are hard to detect visually, FLIR can be used to detect differences in temperature that indicate where seeps are. The plan is to use FLIR on the Trinity River and on Meandering Road Creek. Another new technology for next year is hydrogen release compounds. These compounds release hydrogen which helps bacteria break down TCE.

Sediment sampling was performed last year at Lake Worth. This first phase showed some PCBs in the sediment. Mr. Walters is trying to get about $300,000 to accomplish a second phase of sediment sampling. This second phase would focus more toward Plant 4, where PCBs were detected during the first phase.

Radioisotope Sampling

Mr. Walters provided some background on chlorinated solvents. PCE or perchloroethylene, is a common dry cleaning solvent containing four chlorine atoms in each molecule. If you remove

one of the chlorine atoms, you're left with TCE, which is used as a degreaser at Plant 4. Plant 4 never used PCE, but TCE often contains PCE as an impurity. If one chlorine atom is removed from the TCE molecule, you're left with DCE, or dichloroethene. Remove one chlorine atom from DCE, and the end product is vinyl chloride.

Last year Mr. Walters arranged with the USGS to perform some radioisotope sampling. This sampling was accomplished by Sandra Eberts, Sonya Jones, and Chris Braun of the USGS. Radioisotope sampling is possible because the elements that make up chlorinated solvents (carbon, chlorine, and hydrogen) each have two isotopes, one heavy and one light. Carbon has ^{13}C and ^{12}C. Chlorine has ^{37}Cl and ^{35}Cl. Hydrogen has ^{2}H and ^{1}H. The data on the carbon has been received and Mr. Walters is waiting on the chlorine data. The preliminary data indicates that sources of PCE may exist on site. This data will help to ensure future remediation money is spent wisely.

Another benefit of the radioisotope sampling is that is demonstrates natural attenuation. The results can be used to demonstrate clearly to regulators that the DCE or vinyl chloride used to be TCE, and that natural processes have been breaking down the TCE over time. Monitored natural attenuation has the potential to save millions of dollars in remediation costs.

Carswell off base

Ms. Pate introduced Charles Pringle from the Air Force Center For Environmental Excellence (AFCEE) at Brooks AFB, Texas. Mr. Pringle also works for the Air Force Base Conversion Agency (AFBCA). His primary purpose is to do the clean-ups of the off base sites such as the golf course, the stables, housing, and the Weapons Storage Area (WSA) and then transfer the land. Some land has already been transferred, but the biggest outstanding areas are the golf course and the WSA. These areas will be transferred after completing a Finding Of Suitability To Transfer (FOSTT).

The golf course has part of the TCE plume running across it, and that is going to take some time to deal with. A permeable reactive wall has been installed, and that will help with the clean-up. However, the transfer of the golf course will probably not happen for another two or three years.

The WSA is closer to being transferred. The WSA was used to store bombs when the B-52s were flying out of Fort Worth. The area is 247 acres, with most of the sites needing to be cleaned-up clustered in one portion of the area. The one remaining site in the WSA is an underground storage tank. The final report on the underground storage tank has been turned-in and the FOSTT will be sent out when Mr. Pringle gets a release on the underground storage tank, probably sometime next month. Ninety days after that, the land should be on the street for sale or transfer.

Ms. Pate asked if housing was being built in the area of the WSA.
Mr. Pringle answered that the area was rural, but that housing developments seem to be heading out toward that area.

Carswell on base

Ms. Pate introduced Mike Dodyk, the resident engineer at Carswell. He works for AFCEE at Brooks AFB, but is on-site at Carswell. To date, the AF has received closure on 56 of the 88 sites.

Last month installation was completed on the world's longest permeable reactive wall. The wall is 1,126 feet long and cost over 1.2 million dollars to install. The TCE is moving toward Carswell and the reactive wall has been installed to intercept the plume. The wall is a trench which was excavated to bedrock (approximately 40 feet) and filled with a mixture of sand and iron filings. When the contaminated groundwater flows through the wall, the TCE will react with the iron and break down. Wells will be installed upstream and downstream of the wall to monitor the amount of contamination flowing into the wall and the amount flowing out of it. Once site restoration is complete, the wall won't be seen at all, just the monitoring wells. The wall is a passive system that will operate continuously. Groundwater sampling is scheduled for June and September.

Ten years ago the underground gasoline storage tanks at the base service station leaked and the gasoline got into the groundwater. A remediation system is going to be installed this summer. The system will extract the groundwater and air strip it to remove the gasoline.

Hot spots (where contamination is at a hazardous level) have been identified at SWMUs 40, 54, and 55. These hot spots will be excavated sometime this summer or early fall. When the reports are finished, they will be submitted to the regulators and if approved, hopefully some of these sites can be closed out.

Community Affairs

Ms. Pate introduced Don Yates, a public affairs specialist from Wright-Patterson AFB. Last year he got with Mike Hawkins, AFCEE public affairs director and Greg McGraw of Shaw Corporation and approached several local schools to see if there was any interest in an outreach program. The schools were interested and as a result there was a three day event on March 6th, 7th, and 8th. There was an environmental career fair at White Settlement High School and environmental fairs at White Settlement Middle School and Lake Worth Middle School. They met with over 3,300 students and talked about careers in the environmental profession. They also had activities demonstrating environmental concepts. All the events were a great success. Mr. Yates is planning to do it again next year, and anyone who wants to participate is welcome to.

Next Meeting

Ms. Pate stated that the next RAB meeting will be August 8th.

Open Discussion

Mr. Yates asked if the current meeting site was agreeable with everyone.

No audience members expressed disagreement.
Mr. Yates stated that the location would remain the same until security measures allow RAB meetings to resume on base.

Ms. Pate adjourned the meeting at 6:52 pm.

In Attendance

Carswell DERA (On-Base)

Don Ficklen, HQ AFCEE/ERD
Mike Dodyk, AFCEE, Resident Engineer
Rich Wheeler, Ellis Environmental Group
Rick Levin, Ellis Environmental Group
Mark Webster, Ellis Environmental Group
Miquette Rochford, HydroGeoLogic, Inc.
Lynn Morgan, HydroGeoLogic, Inc.
Adan Karsi, HydroGeoLogic, Inc.
Mike Jackson, HydroGeoLogic, Inc.
Audrie Medina, Booz Allen Hamilton
Christina Hewitt, TN Associates
Rick Horne, IT
Steph Finn, URS
Pat Cossus, URS

Carswell AFBCA (Off-Base)

Charles C. Pringle, HQAFCEE/ERD
Melvin Alli, HQAFCEE
Andrea Linder, AFCEE

Air Force Plant 4

Rick Wice, Shaw
Randal McDowl, Shaw
Don Yates, Wright Patterson Air force Base
Sonja A. Jones, USGS
Sachin Shah, USGS
Christopher Brown, USGS
George Walters, AFP 4 Project Manager, Wright-Patterson AFB

United States Navy

Donald Ray
Bill Wetmore

Texas Natural Resource Conservation Commission

Mark Weegar
Tim Sewell
Ray Risner

Lockheed Martin
Fred Novak
Norman Robins

EPA
Gary Miller

Others (Off-Base)
J'Nell Pate, Community member, co-chair.
Robert Taylor, City of Fort Worth
James Scanlan, Fort Worth Water Department
Allison Thompson, City of White Settlement
Greg Hendrickson, River Oaks
Wayne Lundberg

Comments regarding these meeting minutes should be addressed to:

Rick Levin
Ellis Environmental Group, LC
414 SW 140th Terrace
Newberry, FL 32669
Phone: (352) 332-3888
Fax: (352) 332-3222
rick.levin@ellisenv.com

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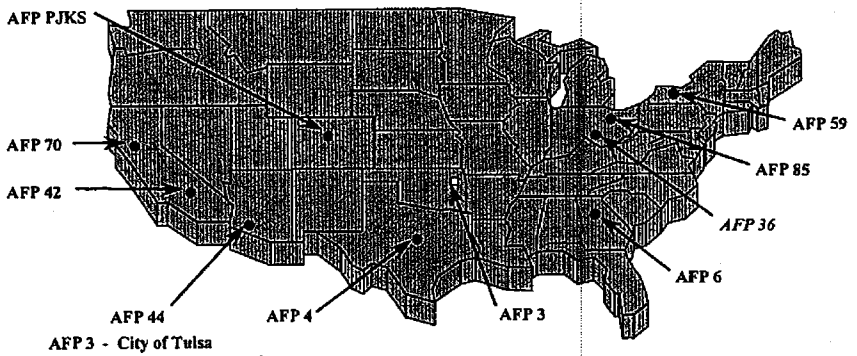
GOCO Plant Locations



AFP 3 - City of Tulsa
AFP 4 - Lockheed Martin Company
AFP 6 - Lockheed Martin Company
AFP 36 - General Electric Company
AFP 42 - Rockwell Intl Corp, Lockheed Advanced Development Co, Northrop Corp
AFP 44 - Raytheon Company
AFP 59 - Lockheed Martin Company
AFP 70 - Aerojet Corporation
AFP 85 - Defense Finance & Accounting Services
AFP PJKS - Lockheed Martin Company

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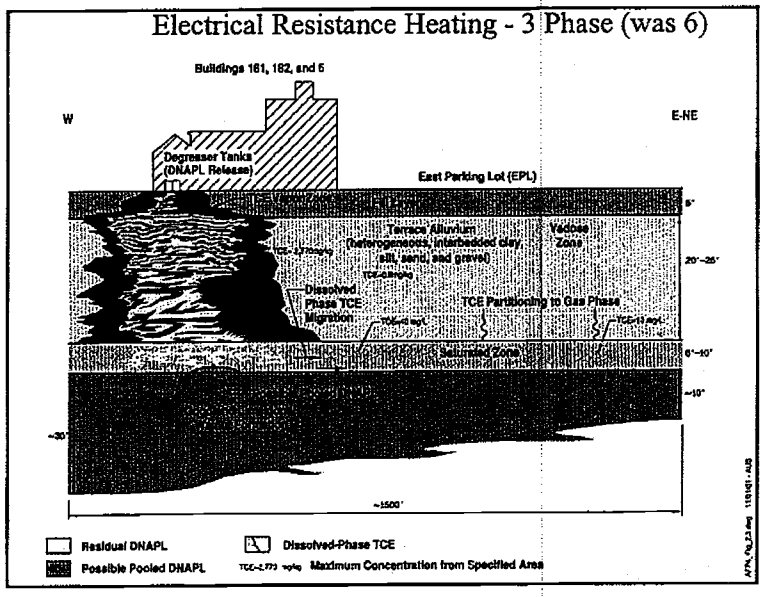
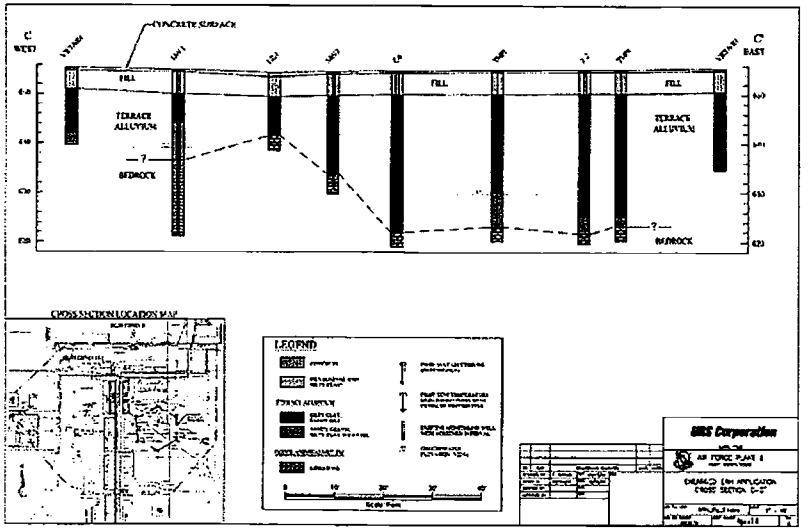
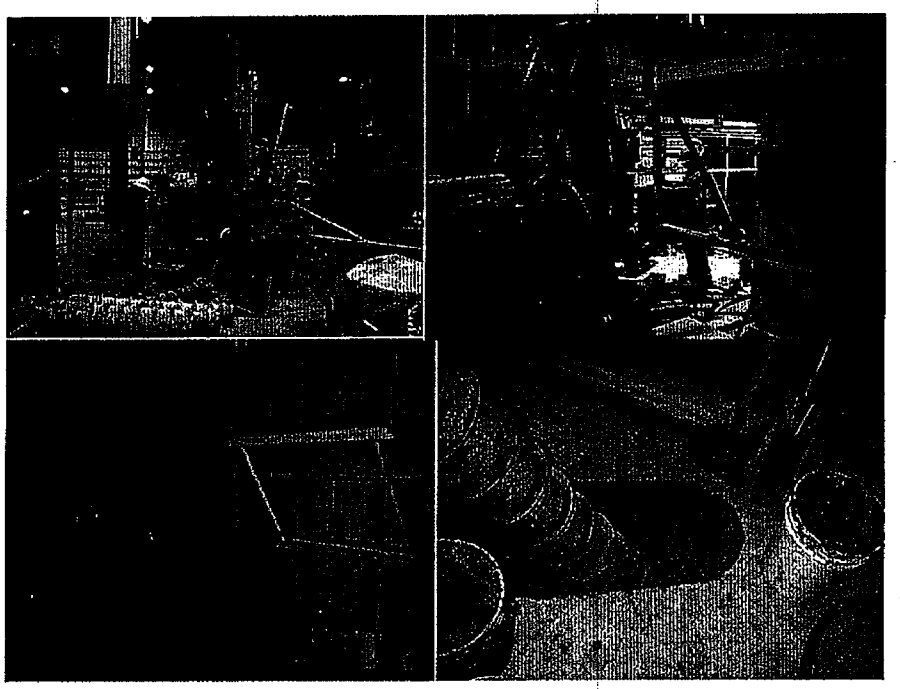
Electrical Resistance Heating - 3 Phase (was 6)

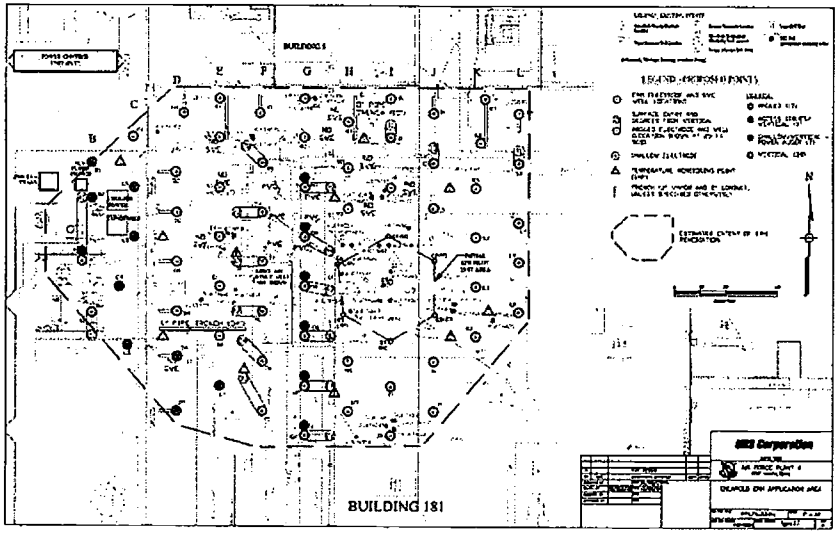


Building 181 and EPL Conceptual Site Model

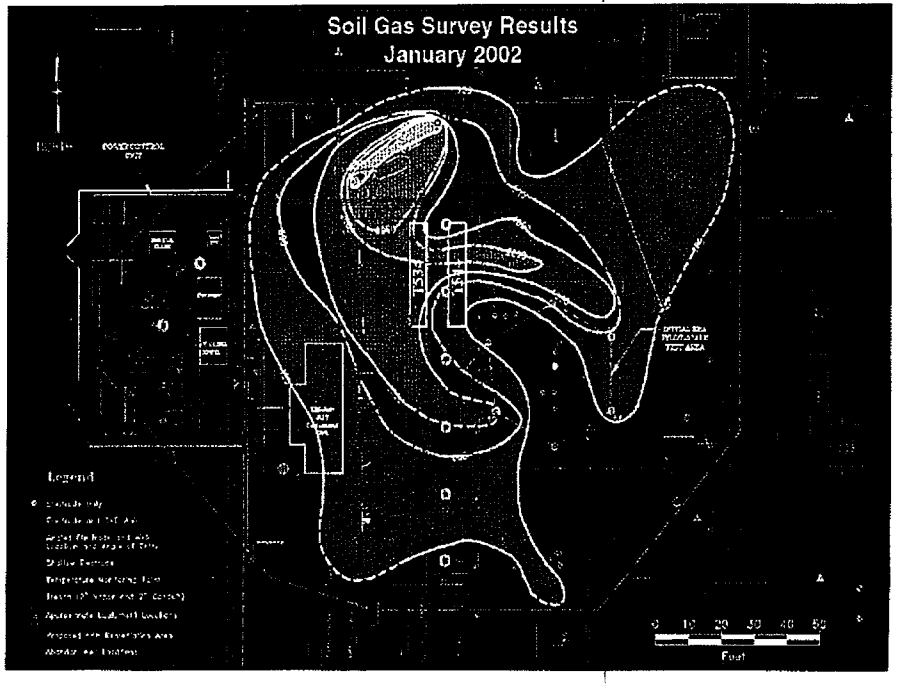


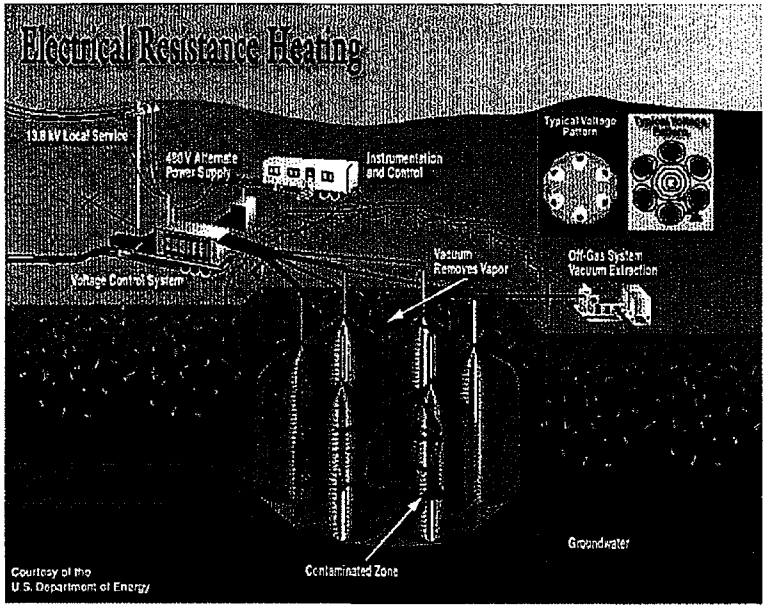
Enlarged ERH Application Cross Section C-C'

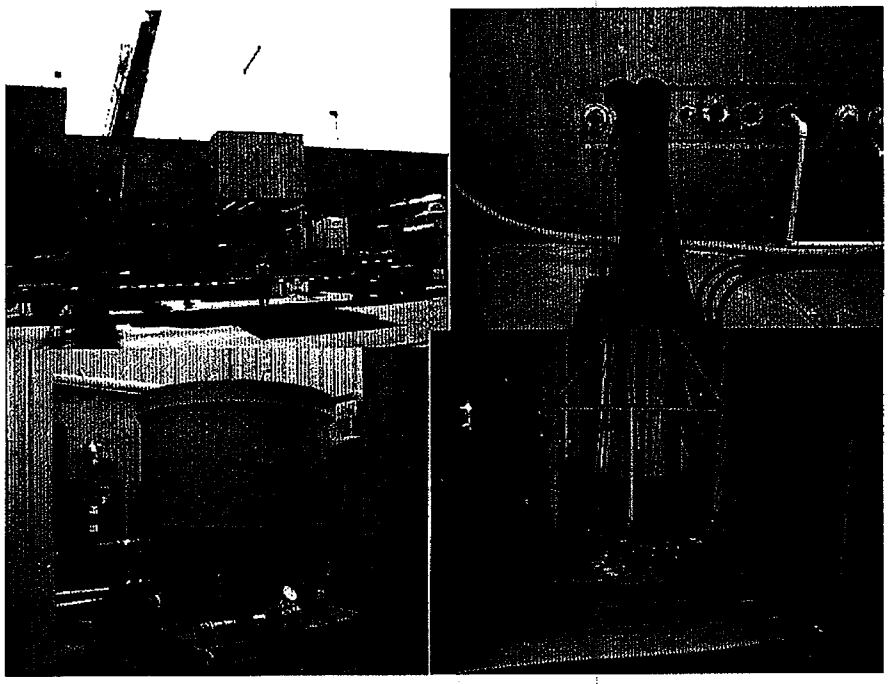




Enlarged ERH Application Area







ON-Going Projects/Activities

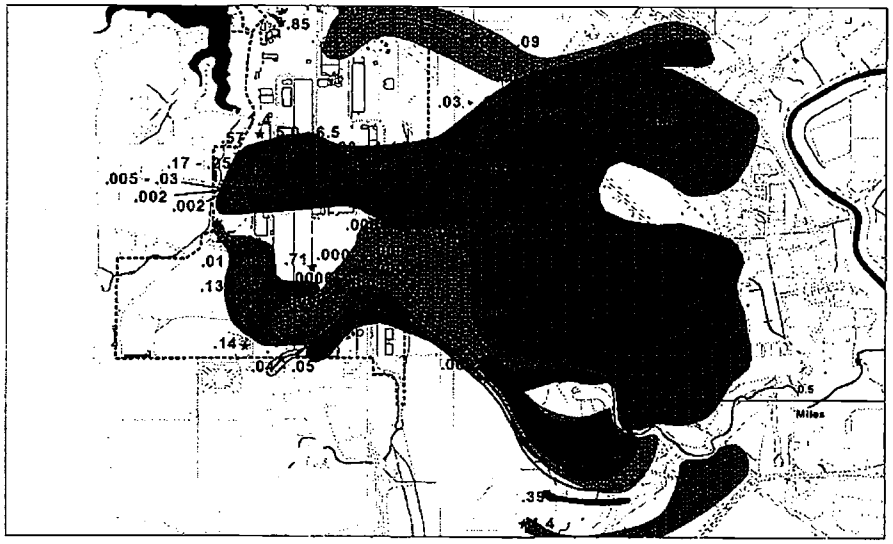
East Parking Lot Treatment System (east) - 52 extraction wells
FSA #1 Treatment System (west) - deep well/French drain
Long-Term Monitoring (2x year - ~ 50 wells)
Five Year Record of Decision Review (every 5 years!)
DNAPL Bailing
Compound Specific Isotope Analysis
Conceptual Modeling
Risk Assessments

FY02-FY03 Budgeting

FY02 Projects
- Operations and Maintenance
- Longterm Monitoring (GW)
- Lockheed Support (utilities)
- USGS (many subtasks- CSIA)
- DNAPL Extraction
- Carswell Plume Actions
- North Parking Lot Inv
- RPO Implementation (LF3)
- Phytoremediation

FY03 Projects
- Operations and Maintenance
- Longterm Monitoring (GW)
- DNAPL Extraction
- USGS (many subtasks)
- Seep Investigation (FLIR)
- Carswell Plume Actions
- Hydrogen Release Comps
- East Parking Lot RPO
- Lockheed Support (utilities)
- Sediment Sampling Lake W.

PCE/TCE Ratios Over Time



USGS
science for a changing world

Assessing the Origin and Fate of Chlorinated Solvents Using Compound Specific Isotope Analysis

By

Sandra Eberts
Sonya Jones
Chris Braun

U.S. Department of the Interior
U.S. Geological Survey

CSIA

- Elements that make up chlorinated solvents (C, Cl, H) each contain two stable isotopes … one heavy and one light ($^{13}C/^{12}C$, $^{37}Cl/^{35}Cl$, $^{2}H/^{1}H$)
- Ratios of heavy to light isotopes are expressed as δ values … per mil (‰) differences of the ratios relative to a standard
- CSIA … determination of stable isotope ratios for individual compounds (PCE, TCE, DCE, VC, Ethene)

USGS

Isotopic Fractionation cont.

Manufacturing processes can result in fractionation …

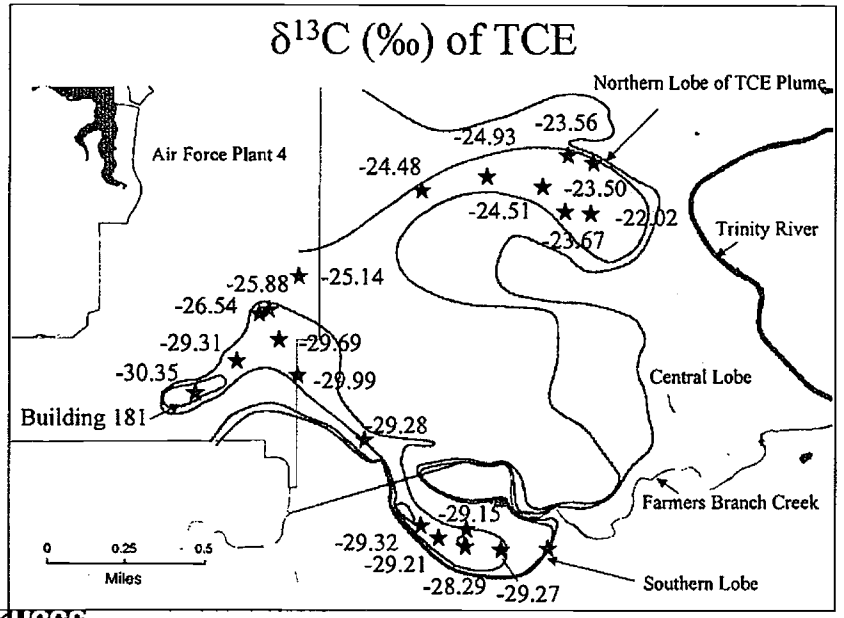
	$\delta^{37}Cl$ (‰)	$\delta^{13}C$ (‰)
Trichloroethene		
DOW	4.08	-31.90
ICI	2.49	-31.32
PPG	-2.54	-27.80

Overall range $\delta^{13}C$ (‰) pure solvent …

TCE –35.27 to –27.80
PCE –37.20 to –23.19

(van Warmerdam et. al 1995)
(Jendrzejewski et. al 2001)

USGS



USGS

Summary of Preliminary Results

- $\delta^{13}C$ supports a conceptual model that includes a northern source with some PCE
- $\delta^{37}Cl$ will likely provide additional information regarding source identification
- $\delta^{13}C$ indicates that Monitored Natural Attenuation (MNA) is worth exploring for remediation of the northern lobe

USGS

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NAS Fort Worth JRB Installation Restoration Program Update

Michael R. Dodyk, P.E.

May 9, 2002

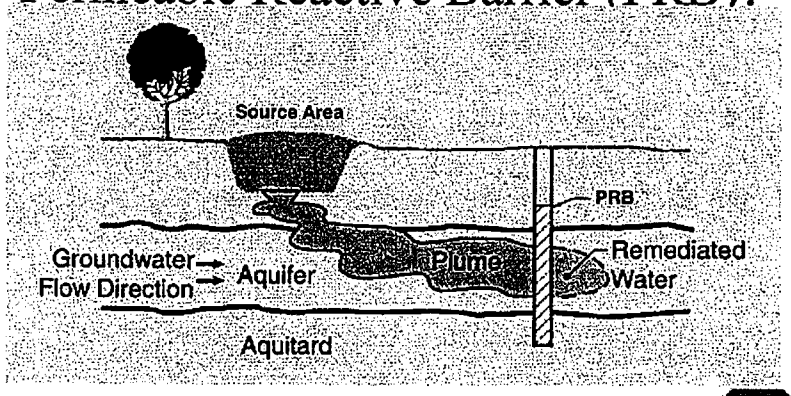
Site Closure Update

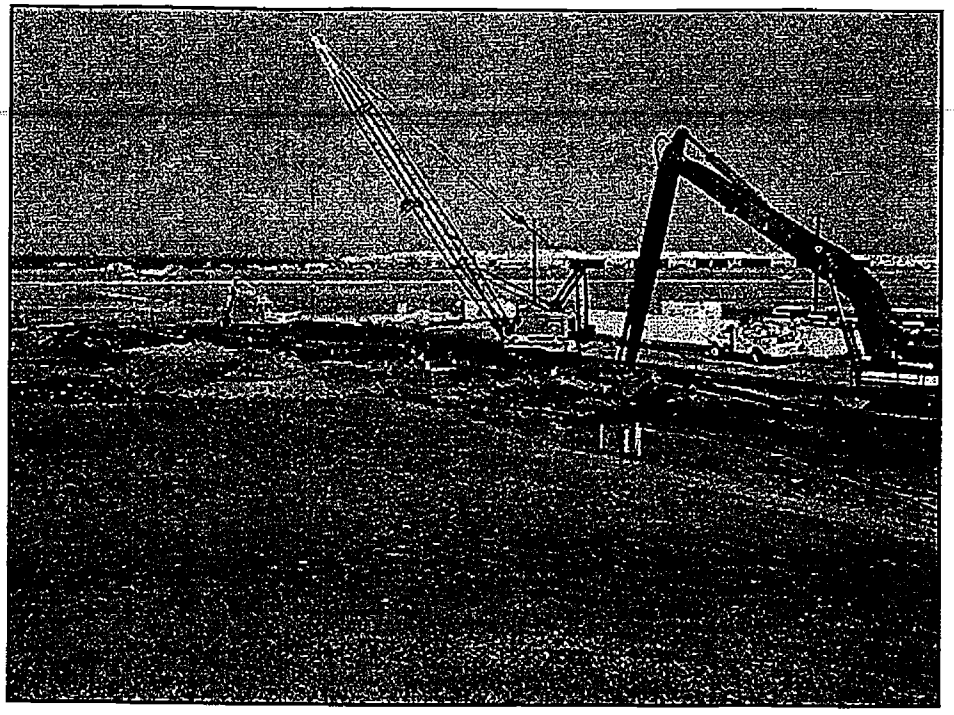
- Several sites were submitted for closure by TNRCC since the February RAB meeting:
  - Area of Concern 19, a suspected former fire training area.
  - Buildings 1015, 1027, 1060, 1064, 1190, 1194, 1414, 1602, 1655, and 4210 Oil/Water Separator sites.
- To date, the Air Force has received closure on 56 of 88 total SWMUs and AOCs basewide.

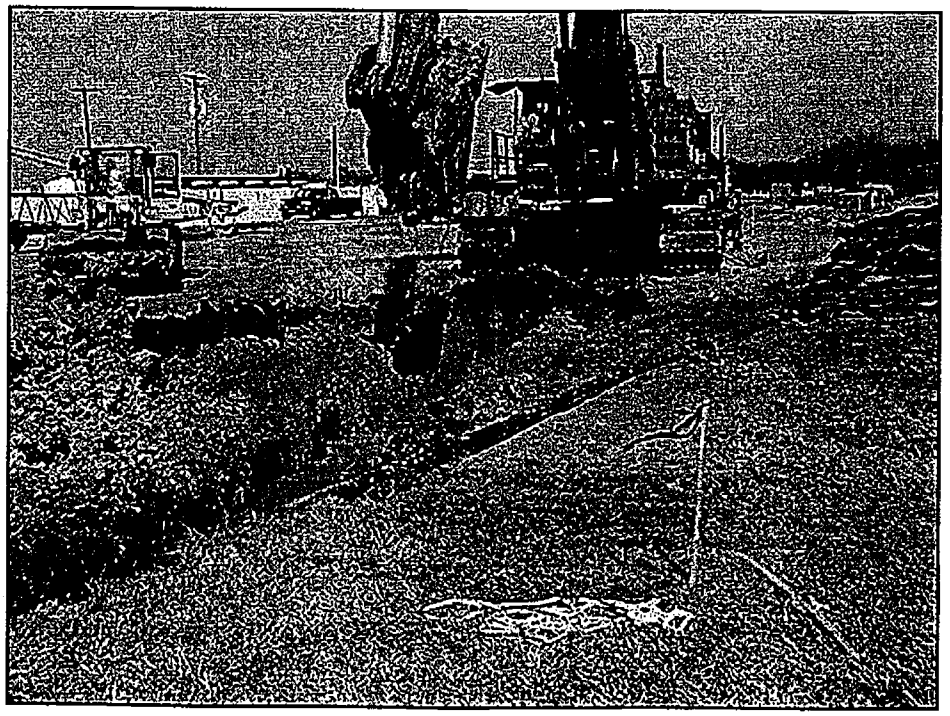
Field Activities

- Installation of the world's longest Permeable Reactive Barrier (PRB) completed last month. The PRB is 1,126 feet long.
- Basewide groundwater sampling conducted last month.
- Groundwater sampling conducted at AOC 1, the base service/gas station.

What Is A Permeable Reactive Barrier (PRB)?







Upcoming Field Work

- **This Month:**
  - Site restoration work will continue for the Permeable Reactive Barrier (PRB).
  - Installation of 14 PRB monitoring wells.
- **Summer 2002:**
  - Installation of a groundwater remediation system at the base service/gas station (AOC 1).
  - Monitoring of the PRB will occur in June and September.
  - Excavation of hot spots at SWMUs 54, 55, and Landfill 1/SWMU 28 will occur later this summer or early fall.

Continued Progress

- **Draft Documents Under Review by AFCEE:**
  - Draft Technical Report for AOC 2.
  - Draft Site Investigation Report for AOC 20.
  - Draft RFI Report for Waste Accumulation Areas 5, 6, 12, 31, and 61.
  - Draft 2001 Annual Groundwater Sampling Report.
  - Draft 2002 Groundwater Sampling and Analysis Plan.
  - Draft Simulation of Groundwater Flow and TCE Transport Report.
  - Draft RFI Report for Landfills 2, 6, 7, and 9 to be submitted to AFCEE for review this month.
  - Draft RFI Report/Groundwater DNAPL Investigation for Waste Pile 07 (SWMU 24).
- **Risk Assessment and Focused Feasibility Study of the southern lobe of the TCE plume continued.**

United States
Environmental Protection
Agency

Office of Solid Waste and
Emergency Response
(5102G)

EPA 542-F-01-005
April 2001
www.epa.gov/superfund/sites
www.cluin.org

EPA

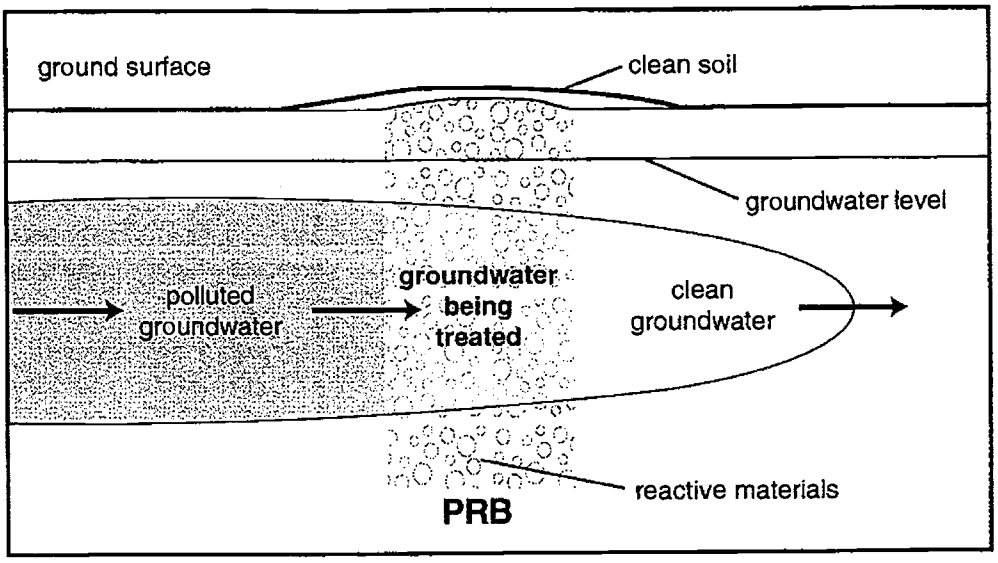
A Citizen's Guide to Permeable Reactive Barriers

The Citizen's Guide Series

EPA uses many methods to clean up pollution at Superfund and other sites. Some, like permeable reactive barriers, are considered new or *innovative*. Such methods can be quicker and cheaper than more common methods. If you live, work, or go to school near a Superfund site, you may want to learn more about cleanup methods. Perhaps they are being used or are proposed for use at your site. How do they work? Are they safe? This Citizen's Guide is one in a series to help answer your questions.

What are permeable reactive barriers?

A permeable reactive barrier or *PRB* is a wall built below ground to clean up polluted groundwater. The wall is *permeable,* which means it has tiny holes that allow groundwater to flow through it. *Reactive* materials in the wall trap harmful chemicals or change the chemicals into harmless ones. Clean groundwater flows out the other side of the wall.



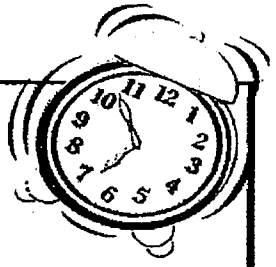
How do they work?

A PRB is built by digging a long, narrow trench in the path of the polluted groundwater. The trench is filled with a reactive material that can clean up the harmful chemicals. Iron, limestone, and carbon are common types of reactive materials that can be used. The reactive materials may be mixed with sand to make it easier for water to flow through the wall, rather than around it. At some sites, the wall is part of a funnel that directs the polluted groundwater to the reactive part of the wall. The filled trench or funnel is covered with soil, so it usually cannot be seen above ground.

The material used to fill the trench depends on the types of harmful chemicals in the groundwater. Different materials clean up pollution through different methods by:

- Trapping or *sorbing* chemicals on their surface. For example, carbon has a surface that chemicals sorb to as groundwater passes through.
- *Precipitating* chemicals that are dissolved in water. This means the chemicals settle out of the groundwater as solid materials, which get trapped in the wall. For example, limestone can cause dissolved metals to precipitate.
- Changing the chemicals into harmless ones. For example, iron can change some types of solvents into harmless chemicals.
- Encouraging tiny bugs or *microbes* in the soil to eat the chemicals. For example, nutrients and oxygen in a PRB help the microbes grow and eat more chemicals. When microbes completely digest the chemicals, they can change them into water and harmless gases such as carbon dioxide. (*A Citizen's Guide to Bioremediation* [EPA 542-F-01-001] describes how microbes work.)

How long will it take ?



Cleaning groundwater with a PRB may take many years. The time it takes depends on two major factors that vary from site to site:

- type and amount of pollution present in the groundwater
- how fast the groundwater moves through the PRB

Groundwater may move a few inches to hundreds of feet per year. Its speed varies from site to site.

Are PRBs safe?

PRBs have a good safety record. Once built, they have no moving parts, equipment, or noise. The reactive materials placed in the PRB trench are not harmful to the groundwater or to people. The polluted groundwater is cleaned underground so cleanup workers can avoid contact with it. Some soil, which may be polluted, must be removed when digging the trench. EPA makes sure that the polluted soils are handled safely. For example, they cover loose soil to keep dust and harmful gases out of the air.

EPA tests the air to make sure that dust and gases are not released. If the soil is polluted, it may be cleaned using another cleanup method. Or the soil is disposed of properly in a landfill. The groundwater is tested regularly to make sure the PRB is working.

Why use PRBs?

PRBs work best at sites with loose, sandy soil and a steady flow of groundwater. The pollution should be no deeper than 50 feet. PRBs clean up many types of pollution underground. Since there is no need to pump polluted groundwater above ground, PRBs can be cheaper and faster than other methods. Very little waste needs to be disposed of in a landfill, which also saves money. There are no parts to break, and there is no equipment above ground so the property can be used while it is being cleaned up. There are no energy costs to operate a PRB because it works with the natural flow of groundwater. PRBs have been installed at more than 40 sites in the United States and Canada.

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ADMINISTRATIVE RECORD

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